

PEDIATRIC EMERGENCY CARE DELIVERY IN CHINA

Zhujin Lu

Emergency Dept.

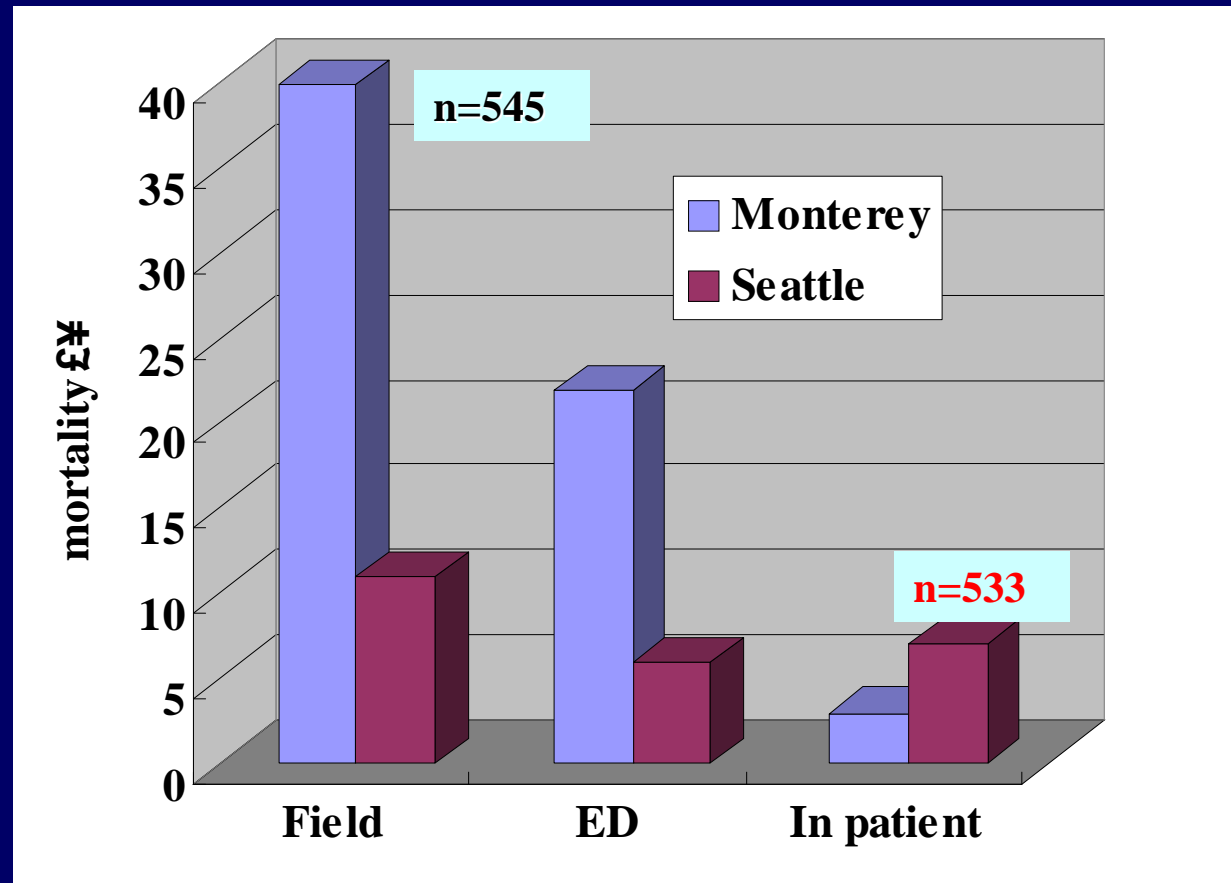
Children's Hospital of Fudan University

Shanghai, China



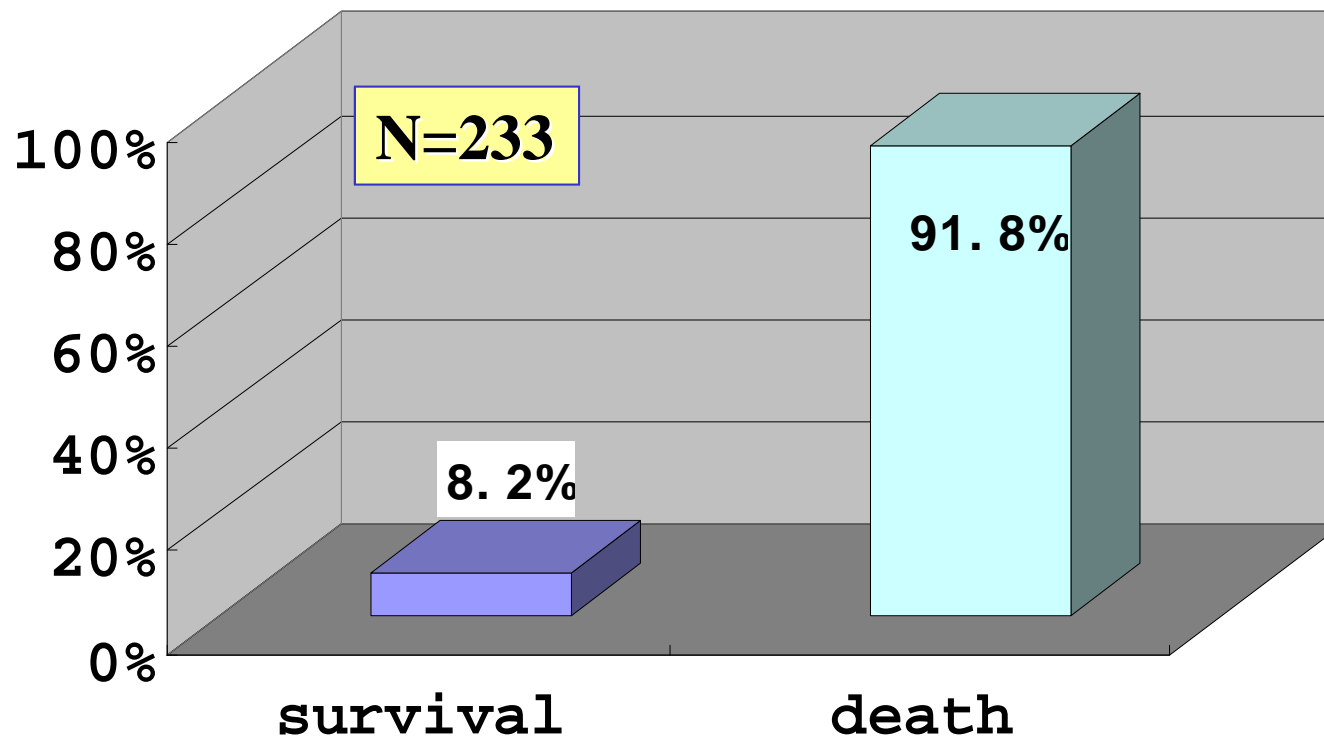
Background and History

Mortality in different emergency care delivery



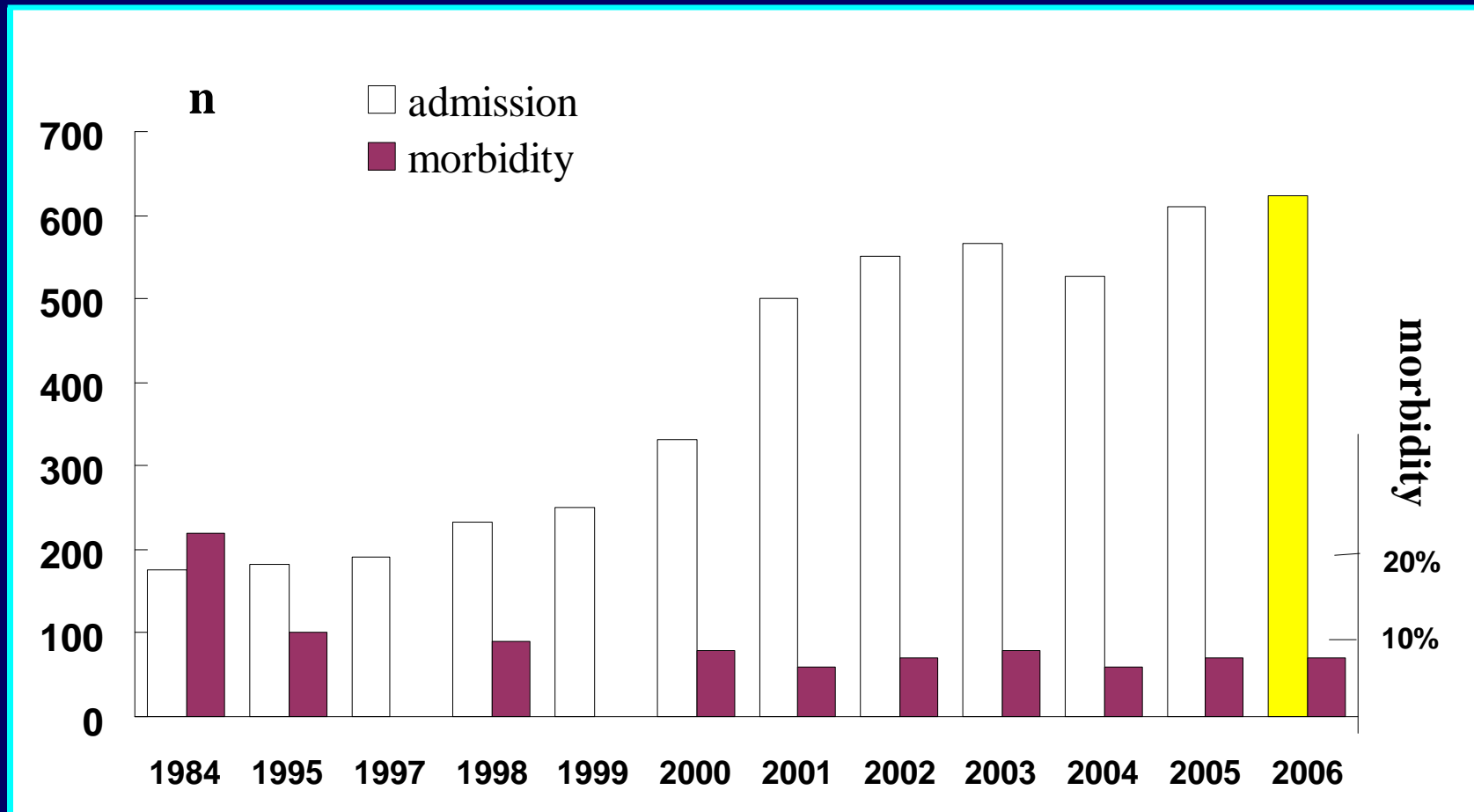
Arreola-Risa C: J Trauma 1995

Pre-hospital CPR



From Shanghai Medical Emergency Centre (2006)

PICU Admission and Morbidity



From Children's Hospital of Fudan University

History of EMSS in China

- EMSS started at 1950s from large and middle cities
- Primary EMS centres were set up: first aid, emergency transport
- In 1970s, hospital based ICU founded; and 1980s in pediatrics
- 1983, the Ministry of Health demonstrated □the program of setting up emergency department in city hospital □
- 1986, the Chinese People Congress set up the laws on emergency medical care
- 1987, the Chinese Association of Emergency Medicine (CAEM) founded
- 1989, CAEM became a member of IFEM
- “120”emergent calling system was founded

EMSS□Emergency Medical Services System

IFEM□ International Federation for Emergency Medicine

Academy and Organization Responsible for EM

International Organization responsible for EM

IFEM – **I**nternational **F**ederation for **E**mergency **M**edicine
founded in 1989

It now consists of **24** country and district memberships

IFEM endorses the principles:

- All countries should provide unrestricted access to emergency health care.
- Emergency medicine encompasses a unique and specified body of knowledge and should be recognized as a specialty in all countries.

Academy and Organization Responsible for EM in China

- Chinese Association of Emergency Medicine (CAEM)
- Pediatric Emergency Branches of CAEM
- Local Emergency Branches of Chinese Medical Association
- Local Pediatric Emergency Branches of Chinese Medical Association

Emergency Medical Service System (EMSS)

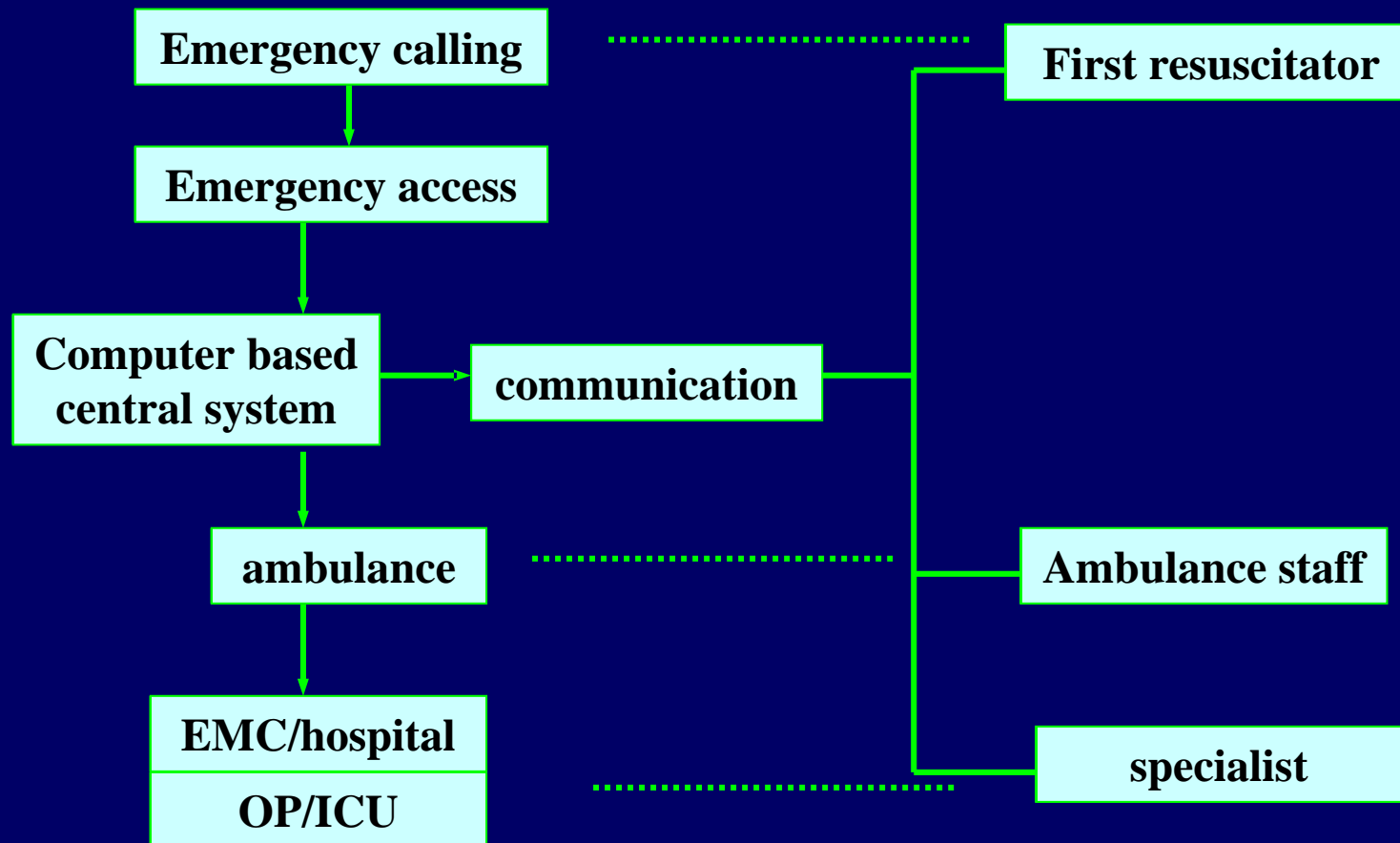
Composition of emergency care delivery system

- **Bystander care (or community medical care)**
- **Emergency transport care (ambulance care)**
- **Hospital based critical care**
- **Corporation nationally and globally**

Emergency Medical Centre (EMC)

- **EMC** is a medical unit for emergency care
- **EMC**: hospital based or universal(general)
- **Computer system network:**
 - access from victim
 - communication: consulting, supervising,
information providing
 - emergency care and transport plan making
 - corporation : bystander, ambulance, referred ED
- **Medical facility:** ED, ICU, Ambulance, Equipments
- **Staff team:** Doctor □ Nurse □ Assistant or driver
- **Staffs:** on call (24hrs) in the EMC

EMSS



The Features in Various Pediatric EMC

Hospital-based EMC

- Operated by hospital
- Has both tasks of care
- Universal pre-hospital care
- Pediatric pre-hospital care
- In-hospital care
- Has good quality of care (neonates, prematures)

Universal EMC

- Operated by EMC
- Universal pre-hospital care for all ages

Other hospital-EMC

- Operated by hospital
- Pre-hospital care is not as frequent as the others
- Has more special feature (neonatal, pediatric, cardiac)

EMC in Shanghai

- Universal EMC
- The only EMC for all ages in Shanghai
- Pre-hospital care
- The main part of transportation in Shanghai
- Government funding



www.sh120.gov.cn

SMEC □ Shanghai Medical Emergency Centre

Pre-hospital Emergency Care

Pre-hospital Emergency Care Compositions

- **First aid: need a quick, effective help to save life**
- Bystander or witness
- Resuscitator skill of CPR
- Calling for help
- Emergency Network
- Transportation

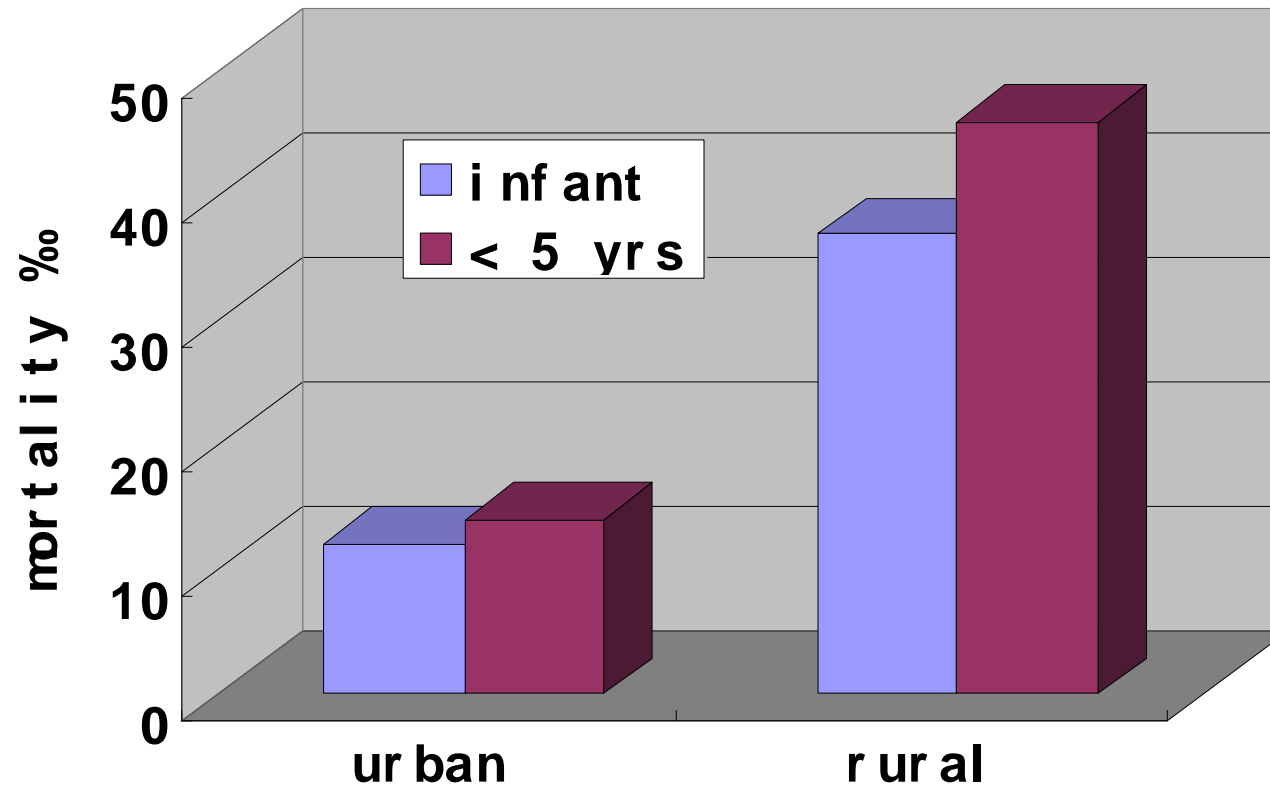


First aid

- First aid is **a developing part of EM** in China, especially in countryside with low density of population
- The CPR training program has started, but the ratio of populations who have got training is lower than expecting
- The EMSS is well developed in urban districts, but is not satisfied in rural areas that cause the medical support could hardly arrive in time

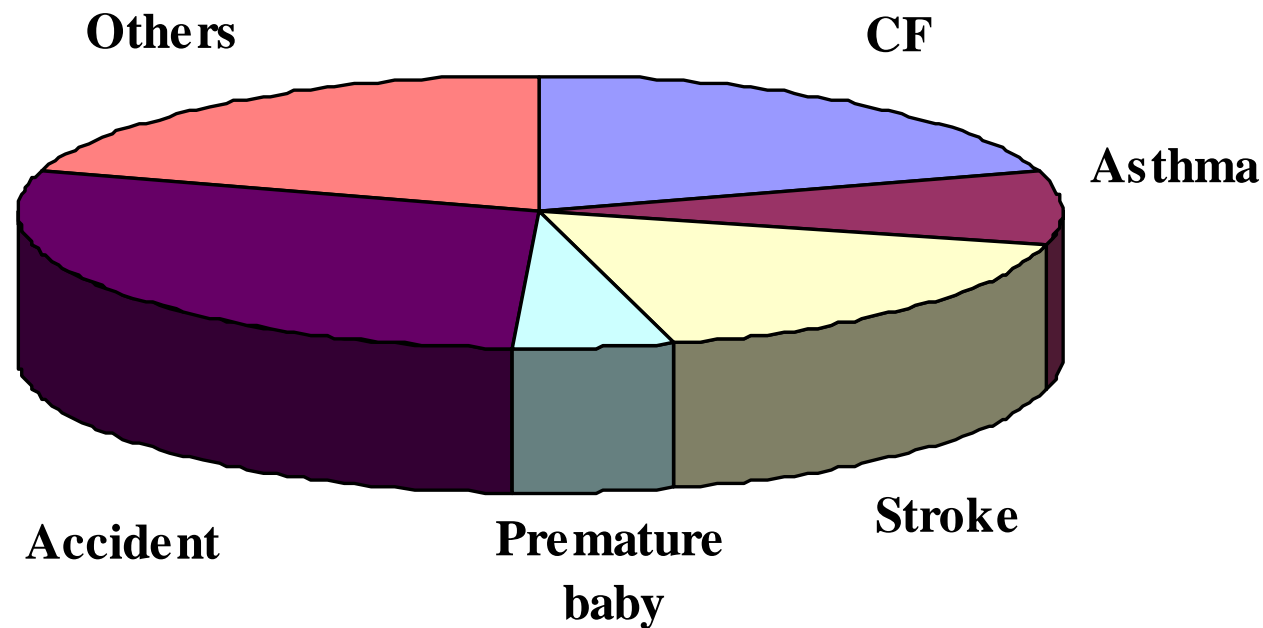
Mortality in different districts

□ 1991 □ 2000 □



From the Ministry of Health of PRC

Victims Who Needs the Pre-hospital Emergency Care



From SMEC in Shanghai 2006

Pre-hospital Emergency Care Compositions

- First aid: need a quick, effective help to save life
- **Bystander or witness**
- **Resuscitator skill of CPR**
- Calling for help
- Emergency Network
- Transportation



Bystander and Witness

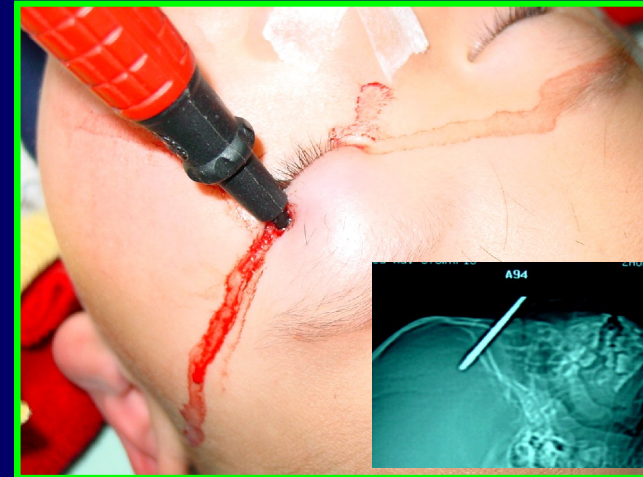
- The proportion of bystanders who can do CPR correctly in emergent case is low in China.
- Training programs in big city is more frequently than rural areas.
- Increasing the number of skilled bystand-rescuer will improve the quality of pre-hospital emergency care

CPR Training

- **BLS/ALS training programs**
 - BLS/ALS course in large and middle cities**
 - international life support program**
 - internet resource for instruction**
- **Trainee candidates:**
 - junior medical staff, policeman, civil servant**
 - soldier □ volunteer, driver, teacher**
- **The total number of trainee couldn't meet the need that we expected**
- **Training in countryside and poor educated district should be enhanced**

Pre-hospital Emergency Care Compositions

- First aid: need a quick, effective help to save life
- Bystander or witness
- Resuscitator skill of CPR
- **Calling for help**
- **Emergency Network**
- Transportation



Calling for help

- **“120 ”emergency calling**

Mobile phone dials 120

Public telephone dials 120

Family telephone dials 120

- **Emergency station nearby responses**
- **Community emergency network corporation**

Pre-hospital Emergency Care Compositions

- First aid: need a quick, effective help to save life
- Bystander or witness
- Resuscitator skill of CPR
- Calling for help
- Emergency Network
- **Transportation**



Emergency Transport Programming

- Every district/county have 4~5 emergency care station for first aid and transportation
- 20 ambulance/EMC
(average 1 ambulance per 50 thousand population)
- Wireless communication
mobil-phone, wireless data transmission, radiostation, GPS,
- Emergency officers and staffs 24 hrs on call
- Keeping close touch between different stations and EMC
- National and international net work. (**International SOS**)

EMC setting in Shanghai

(2005)

- **Service radius for rescuing :**
3~10 km □ access to arriving time 10~20 min
- **Transport team in EMC (3 staffs/team)**
doctors, nurses, and drivers with rescuing experience
- **At least 20 ambulances in one station**
- **More than 5~6 ambulances on call and 2 for backup**
- **1 ambulance for 50,000 population**
- **Up to now, most pre-hospital care services are for all-ages**

Emergency Transport Carrier

- **Ambulance is the main carrier for emergency transport in China (most located in EMC)**
- **Other carriers:**
 - city: taxi, truck, bus, car
 - countryside: cart, tractor
 - fishing or sailing: ship/boat
 - long distance transportation: aircraft, (no helicopter)
 - chattered flight
- **Long distance transport is performed in special cases and usually associated with international transport**
 - Shanghai-Taiwan, Shanghai-Tokyo,
 - Guangzhou-Germany, Beijing-Hong Kong

Pediatric Emergency Transportation

- Usually share with the adult transport system
- Pediatric transport system is improving
- Facilities in transport carrier:

First-aid kit

Portable vital monitor

Intubation kit

O₂ supply

Suction unit

Portable ventilator

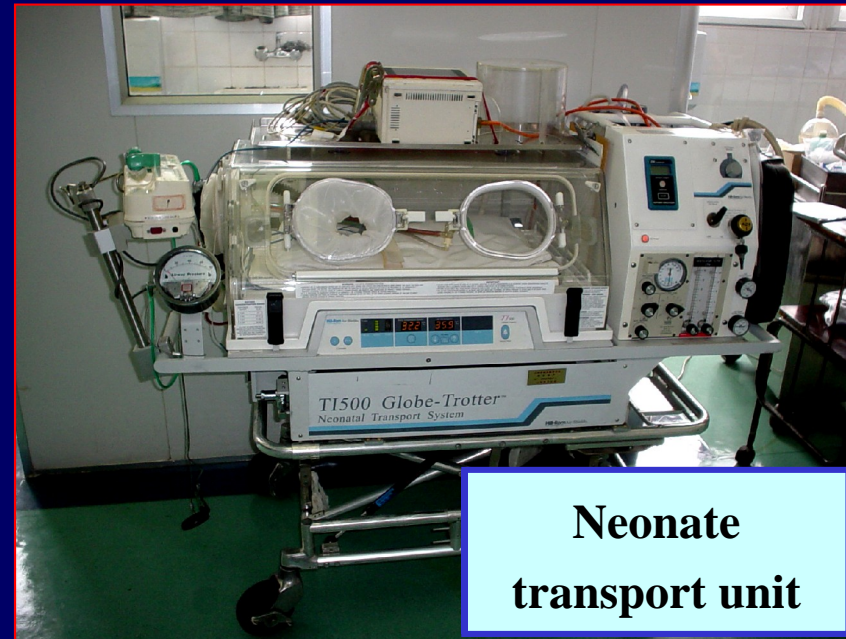
Defibrillator

IV infusion system

Dry blood gas analyzer

Communication mobile

- Neonate transport unit

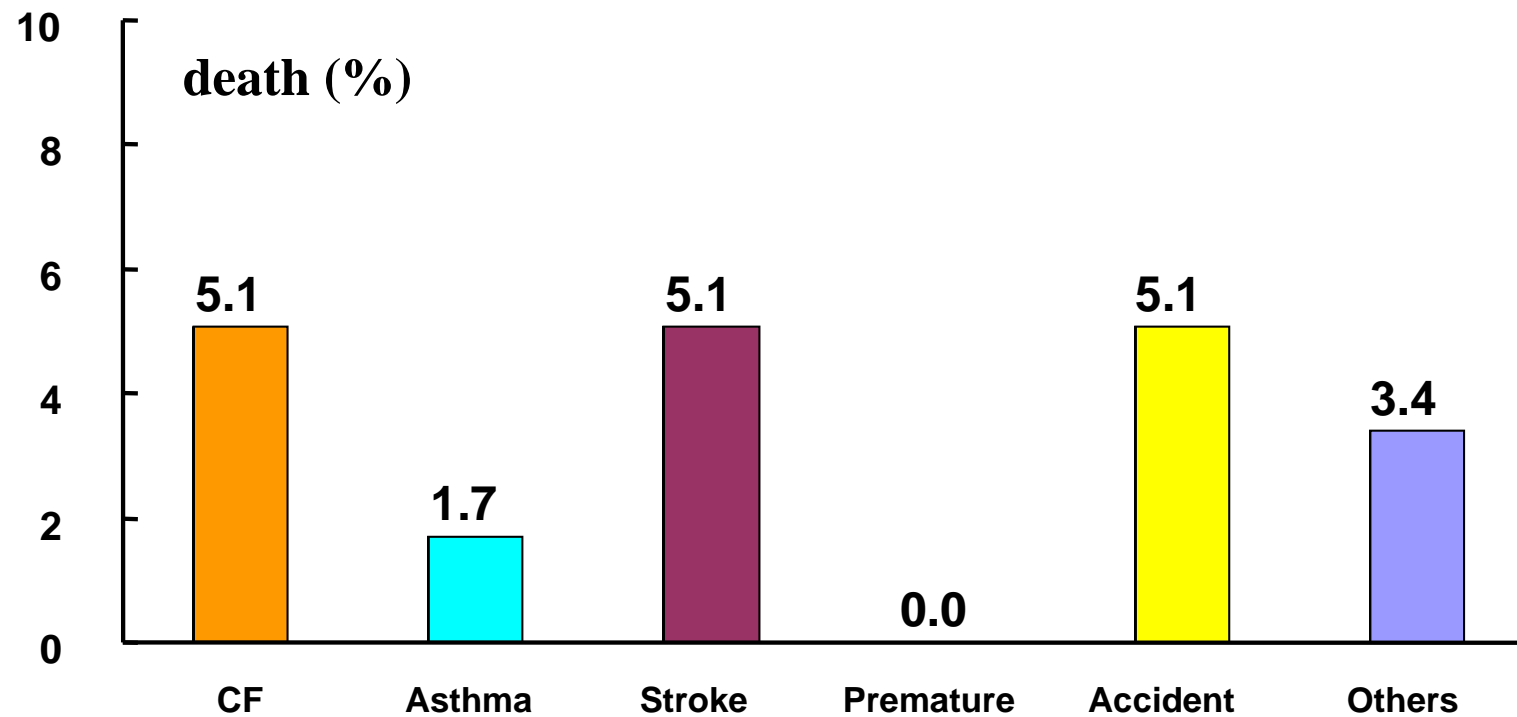


Neonate
transport unit

The Causes of Children with Emergency

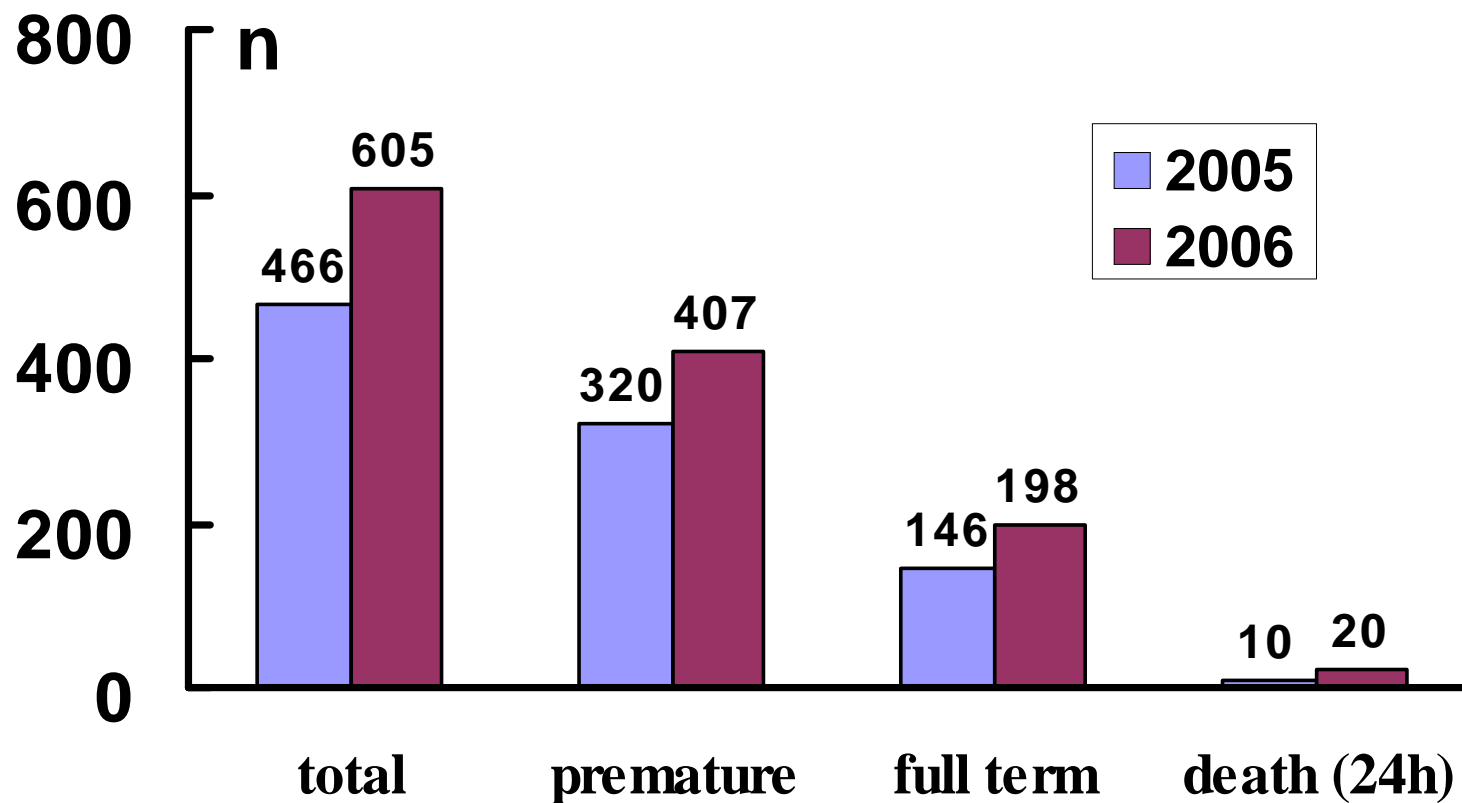
- **Traffic accident**
- **Near drown**
- **Pneumonia**
- **Perinatal emergency**
- **Poisoning**
- **Aspiration**
- **Cardiopulmonary arrest**
- **Sepsis**
- **Hypoxemia**
- **Status convulsion**
- **Arrhythmia**
- **Wounded**
- **Bites**
- **Fracture**
- **electric shock**
- **suicide**
- **abuse**

Morbidity in Emergency Transport



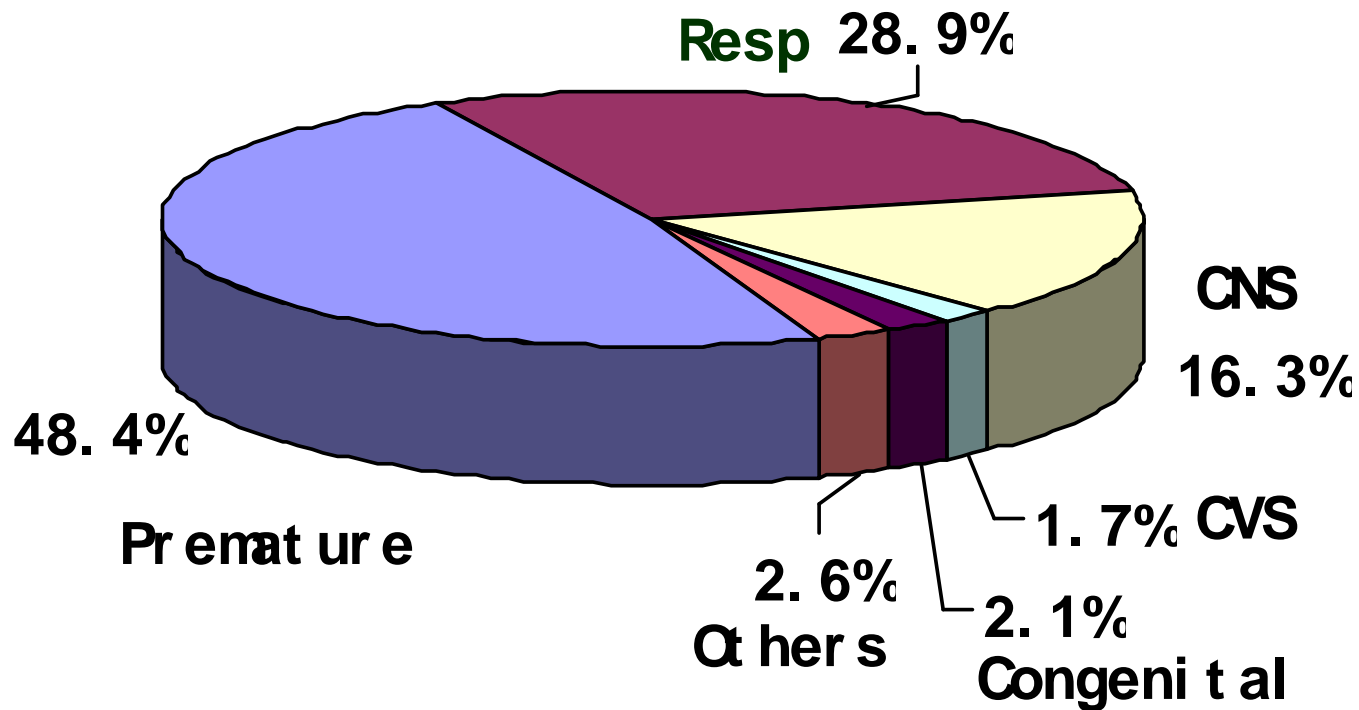
From SMEC in Shanghai 2006

Neonatal Emergency Transportation



from the Children's Hospital of Fudan University in Shanghai

Neonatal Emergency Transportation



Shanghai (2005~2006)

Hospital based transport of children



In-hospital Emergency Care

Emergency Room (ER)

- Emergency room for all ages (general hospital)
- Emergency room for children (pediatric hospital)
- Resuscitating Room in ER
- Observation room in ER
- In-hospital staff emergency calling system
- EICU for children is not popular in china
- Staffs □ from pediatrician, or from specialist, or physician after training

EICU - Emergency ICU

Intensive Care Unit

- The final transport destination of unstable patient
- ICU divided according to different categories□

Neonates: **NICU**

Children: **PICU**

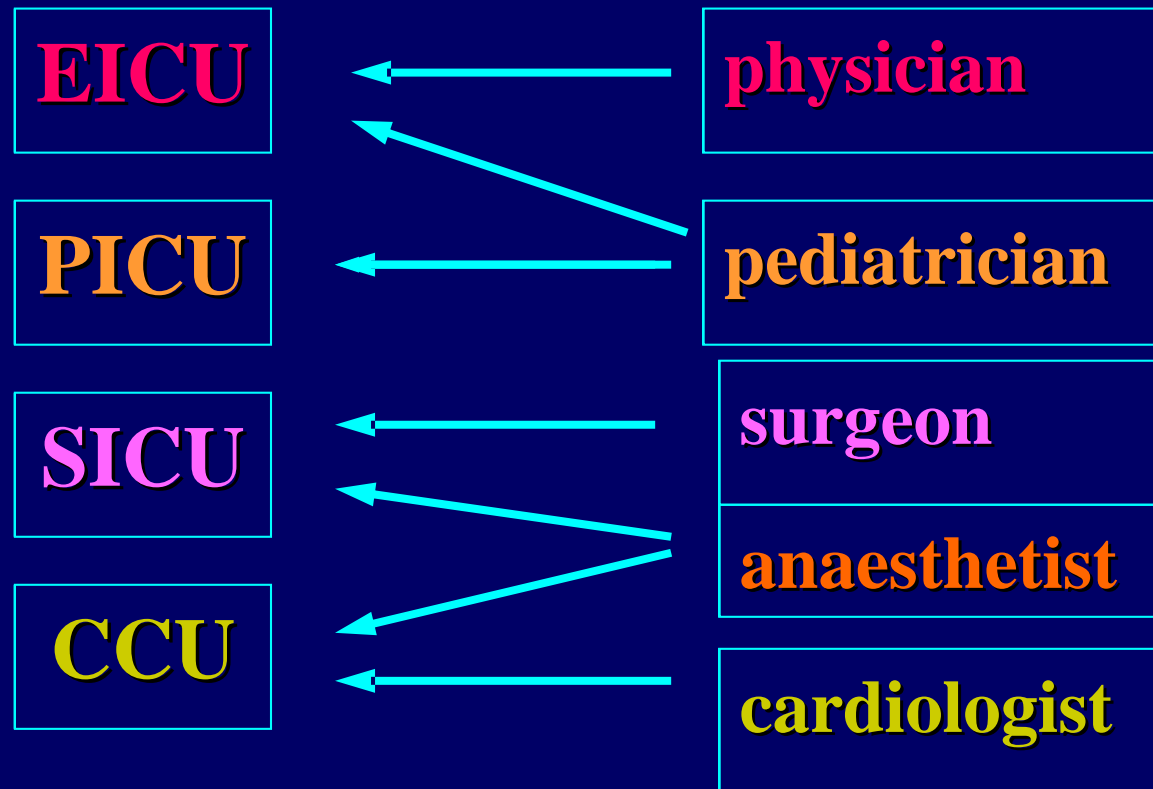
Pediatric Surgery: **SICU**

Emergencies: **EICU**

Cardiology: **CICU (CCU)**



Staffs in PICU



Emergency Care Quality Assurance

Quality Assurance System

- Updated Guideline of CPR in China
- Evaluating the quality of emergency medical centre/
station annually
- Quality evaluating system is supervised by CAEM

Criteria for Quality Measurement

- Response time
- Practice skills performance
- Customer service
- Equipment maintenance
- Continuing education
- Prehospital Care Evaluation Score



Emergency Professional Training Promotion

- Professional training in ED,ICU
- ALS / BLS Training course
- Emergency medicine academic conference
- International academic exchange□

Academic conference

Fellow visitor

Clinical training

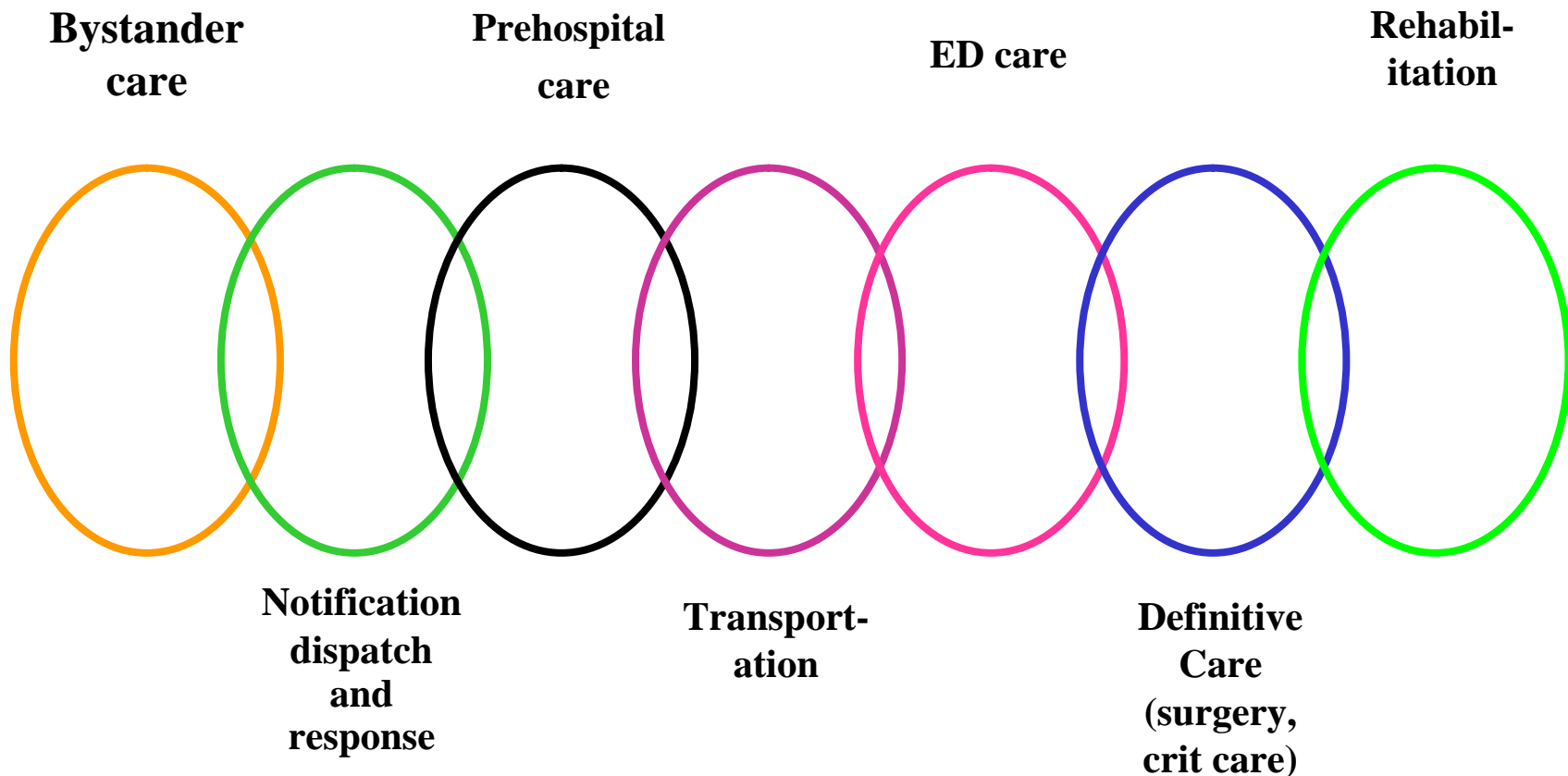


Prospect of EM

Hot Topics on Emergency Care Delivery

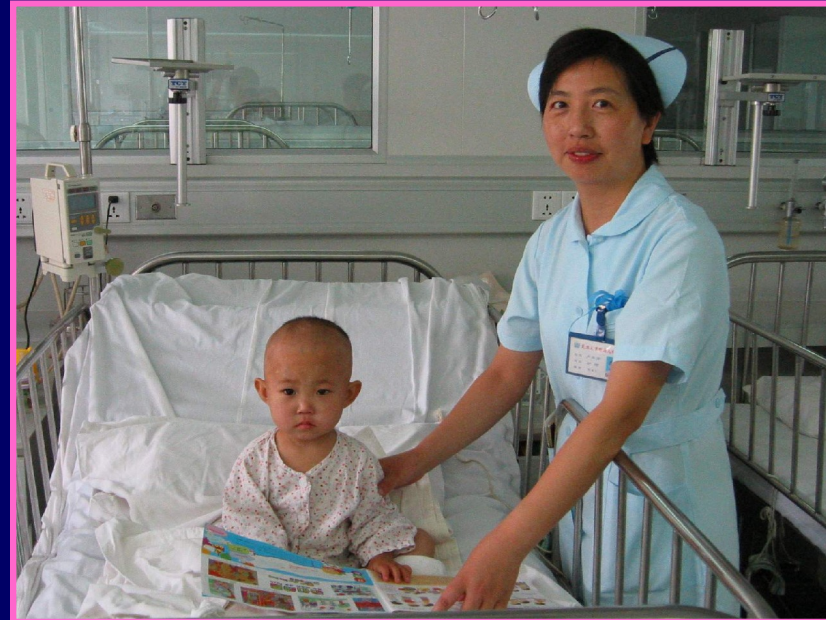
- **Improving pre-hospital emergency care**
- **Expanding the community emergency network**
- **Public emergency education**
- **Informal EMSS ?**
- **Finance and fund for emergency care service**

Chain of resource necessary for comprehensive care



Thanks
for

Attentions !



CAEM □ **Chinese Association of Emergency Medicine**

ED □ **Emergency department**

EM □ **Emergency Medicine**

EMC □ **Emergency Medical Centre**

IFEM – **International Federation for Emergency Medicine**

PICU □ **Pediatric Intensive Care Unit**

SMEC □ **Shanghai Medical Emergency Centre**

Emergency Care Delivery

- Provide first aid whenever or wherever it is needed
- Initial cardiopulmonary support and transport
- Advanced emergency care in hospital
- The coverage of care should be as wide as possible
- Rehabilitation assistance

Emergency Transportation

(n=59)	Cases	Death
Cardiac Failure	12	3
Asthma	5	1
Stroke	10	3
Premature baby	3	0
Trauma/Poison	17	3
Miscellaneous	12	2
Total	59	12
Survivals	79. 7%	

* SMEC 2006

***Community Emergency Network**

- **Community emergency network is developing in cities**
- **Emergency branch station is located in community**
- **There are training course for community residents**
- **The branch is equipped and stands by for EM calling**

Serves as the first emergency responder

Emergency calling system between family and station

Staff workers assisting emergency care and transport

Simple medical kits for first aid:

O₂, splint, stretcher, bandage, first-aid kit

***Emergency Transport**

City	Shanghai	Tokyo
Areas / km²	6340	1759
Population $\times 10^4$ km^2 km^2	1349	1147
Times of transport	105, 364	511, 000
Ambulance on call	56	198
Emergency stations	23	198
Responding time (min)	11. 3	5

In-hospital Emergency Care

- Emergency care is more developed in urban district
- There are **pediatric emergency departments** in every center hospital of different cities or counties
- Each hospital and each ward are equipped with facilities for resuscitation and **staffs on-call**
- **Pediatric intensive care units** are located in referred hospital or children's hospital in moderate or big cities
- Pediatric in-hospital emergency care is better than pre-hospital care

*Ambulance Equipments

Intensive care ambulance

- first-aid kit
- Oxygen cylinder
- Anaesthetic laryngoscope
- Automatic respirator
- Resuscitation mask
- Suction unit
- Pulse oxymeter
- ECG equipment (12 leads)
- Defibrillator
- Portable blood sugar detector
- Electric thermometer
- Cervical gear; Splint
- Soft stretcher
- wheel stretcher

General ambulance

- first-aid kit
- Oxygen cylinder and bag
- Resuscitation mask
- ECG equipment (12 leads)
- Cervical gear
- Splint
- Soft stretcher
- wheel stretcher

***Critical Care in PICU**

- **Life support as the main task and multi-specialty involved**
- **Vital signs monitoring for critical cases and post-operation**
- **Invasive monitoring: hemodynamics, ICP**
- **Emergent imaging scan: echo, CT**
- **ALS equipments**
- **Mechanical ventilation: CMV, HFOV,**
- **Special treatment: NO, surfactant,**
- **Extracorporeal life support □ CRRT, TPE, ECMO**
- **In-hospital calling system for emergencies**

***EM Developing in China**

- **National and international emergency network system**
- **Setting up the chain of comprehensive care**
- **Improve the quality of emergency care in each field and expand the coverage of emergency care**
- **Improve the quality and quantity of research in the field of emergency care**

Prehospital Care Evaluation Score

Score evaluation

- ☐ 16 Excellent
- ☐ 12 Good
- ☐ 8 Pass
- ≤ 8 Unsatisfied

Measurement	Result	Score
first CPR success rate (%)	≥ 5	4
	≥ 2.0	3
	≥ 1.5	2
	≥ 1	1
	<1	0
Response to present (min)	≤ 0	4
	≤ 10	3
	≤ 13	2
	≤ 16	1
	>16	0
Delayed (£ ¥	≤ 0	4
	≤ 3	3
	≤ 4	2
	≤ 5	1
	>5	0
Emergencies / Population (£ ¥	≤ 1	4
	≤ 0.8	3
	≤ 0.6	2
	≤ 0.4	1
	<0.4	0
Performance in Emergency	excellent	4
	good	2
	unsatisfied	0
Satisfaction from patient (£ ¥	≥ 5	4
	≥ 0	2
	<0	0

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